Amendments to the Specification

The paragraph starting at page 1, line 6 and ending at line 16 has been amended as follows.

The present invention relates to an image recording apparatus for recording images onto a recording medium, an image processing apparatus applied ~~Ithereto,~~ thereto, and a method of controlling the image processing apparatus. More particularly, the present invention relates to an image recording apparatus, an image processing apparatus, and the like, which measure, without using time measuring means, a time interval in which a recording operation is not performed, and control a recovery operation of a recording head according to the measurement result.

The paragraph starting at page 1, line 19 and ending at page 2, line 14 has been amended as follows.

An image processing apparatus equipped with an ink-jet recording unit (including a recording head) suffers from a problem that, when a recording operation such as copying or printing is not performed for a long period of time, clogging occurs in a nozzle portion of the recording head for ejecting ink, thereby causing a non-ejection state of ink. To solve this problem, there have been several attempts to provide time measuring means (such as an RTC) for generating real time data in a main body control unit of the image processing apparatus to measure a time interval in which the image processing

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apparatus has not performed a recording operation in accordance with this real time data so that a recovery operation of the recording head may be controlled on the basis of the time interval. For example, in accordance with the measured time interval during non-recording operation, ~~conducted is~~ a recording preparation operation is conducted where the number of suction recovery operations for recovering the nozzle portion of the recording head from clogging and an amount of suction are adjusted, thereby eliminating the clogging in the nozzle portion and preventing the occurrence of the non-ejection of ink.

The paragraph starting at page 6, line 16 and ending at line 23 has been amended as follows.

In the description, "recording" (possibly described as "printing") not only means ~~to form~~ forming meaningful information such as character, graphics, etc., but also ~~widely~~ broadly implies ~~to form~~ forming images, figures, patterns, etc., onto a recording medium irrespective of whether they are meaningful or not or whether they are made manifest to be visually perceived by human beings or not, and also means ~~to process~~ processing the recording medium.

The paragraph starting at page 7, line 8 and ending at line 12 has been amended as follows.

Furthermore, the term "recording medium" is refers not only to papers used

in general recording apparatuses, but also to materials onto which ink can be applied ink,

widely broadly including cloths, plastic films, metal sheets, glasses, ceramics, woods,

leathers, etc.

The paragraph starting at page 7, line 13 and ending at line 21 has been

amended as follows.

Moreover, the term "ink" (possibly (often described as a "liquid") "liquid"),

which is to be understood as widely broadly as the definition of the above term "recording

(printing)" above, refers to a liquid to be applied onto a recording medium, which is

available to form images, figures, patterns, and the like, to process a recording medium,

and to treat the ink (e.g., to solidify or insolubilize a coloring agent in the ink applied to the

recording medium).

The paragraph starting at page 7, line 24 and ending at page 8, line 9 has

been amended as follows.

FIG. 5 is a perspective view schematically showing an external appearance

of a constitution of an ink-jet printer IJRA in a typical embodiment of the present

invention. In FIG. 5, a carriage HC, which is engaged with a helical groove 5004 5005 of a

lead screw 5005 5004 that is rotated interlockingly with forward-reverse revolution rotation

of a drive motor 5013 via driving force transmission gears 5009 to 5011, has a pin (not shown) and is reciprocated in directions of arrows a and b while being supported by a guide rail 5003. An integrated ink-jet cartridge IJC which incorporates a recording head IJH and an ink tank IT is mounted on the carriage HC.

The paragraph starting at page 8, line 10 and ending at line 16 has been amended as follows.

A sheet press plate 5002 presses a recording sheet P against a platen 5000 over the entire range of movement of the carriage HC. A photocoupler 5007, 5008 is a ~~home-position~~ home-position detector for performing switching of the direction of revolution of the driving motor 5013 by ascertaining the presence of a lever 5006 of the carriage HC within the above-described range.

The paragraph starting at page 9, line 11 and ending at line 17 has been amended as follows.

Each of these capping, cleaning and suction recovery operations is configured so that desired processing can be performed at a corresponding position by the operation of the lead screw ~~5005~~ 5004 when the carriage HC reaches a region at the home position side, and can be applied to this embodiment ~~providing~~ so that a desired operation is performed at a well-known timing.

The paragraph starting at page 11, line 13 and ending at line 19 has been amended as follows.

The RAM 103 is composed of an SRAM (static RAM) or the like, stores program control variables, setting values entered by an operator, management data of the image processing apparatus, or the like, and has a buffer area for various ~~works~~ uses. The time data formed by the CPU 101 in this embodiment is stored in this RAM 103.

The paragraph starting at page 11, line 20 and ending at line 25 has been amended as follows.

An image memory 104 is composed of a DRAM (dynamic RAM) or the like, and is able to store image data. A data conversion part 105 is able to perform image data conversion including analysis of a page description language (PDL) and the like and CG (computer graphics) development of character data.

The paragraph starting at page 11, line 26 and ending at page 12, line 11 has been amended as follows.

A reading control part 106 applies various image processings such as binarization and halftoning via an image processing control ~~part~~ part, which is not shown, to image signals provided by a reading part 107 which optically reads a document by a CIS

image sensor (contact image sensor) and converts it into electrical image data, and the reading control part 106 then outputs high-definition image data. The reading control part 106 ~~is supporting~~ supports both a sheet reading control method of reading a document while feeding it and a book reading control method of scanning a document on a table that the document is to be placed on.

The paragraph starting at page 13, line 3 and ending at line 16 has been amended as follows.

A ~~cording~~ coding decoding processing part 110 encodes or decodes and magnifies or reduces image data (MH, MR, MMR, JBIG, JPEG, etc.) handled in the image processing apparatus. A recording control part 111 applies various image processings including smoothing, recording density correction, and color correction via the image processing control ~~part~~ part, which is not shown, to image data to be printed, in order to convert it into high-definition image data, then outputs the converted image data to a USB host control part 113. The recording control part 111 controls the USB host control part 113 to thereby function ~~as~~ to periodically ~~acquiring~~ acquire status information data of the recording unit 200.

The paragraph starting at page 13, line 17 and ending at line 25 has been amended as follows.

A USB function control part ~~112~~ 112, which is responsible for controlling communication over a USB interface, controls protocols in conformity with USB protocols, and converts data from USB control tasks executed by the CPU 101 into packets to transmit them as USB packets to an external information processing terminal, or inversely, converts USB packets coming from the external information processing terminal into data to provide it to the CPU 101.

The paragraph starting at page 14, line 22 and ending at page 15, line 3 has been amended as follows.

A RAM 204 comprises a receiving buffer, raster buffer, print buffer, work area, etc., in the recording unit 200. The recording head ~~205(IJH in FIG. 5)~~ 205 (IJH in FIG. 5) has a plurality of nozzles from which ink is ejected onto a recording medium to execute recording. A motor 206 is a driving part for activating delivery of the recording medium, movement for scanning of the recording head 205, and a suction operation to recover a group of nozzles of the recording head 205.

The paragraph starting at page 15, line 4 and ending at line 11 has been amended as follows.

A nonvolatile memory 207 stores time data and the like transmitted from the main body control unit 100, and is composed of an NVRAM or the like. By

determining the difference between the time data at starting of the preceding recording

operation that is stored in this memory and the time data at ~~staring~~ starting of the present

recording operation, a time interval in which recording has not been performed may be

calculated.

The paragraph starting at page 15, line 22 and ending at page 16, line 7 has

been amended as follows.

First, in step S201, an initial value or a backup value is set in a time data

storage area allocated in the RAM 103 of the main body control unit 100 in order to

initialize time data. Next, a system clock of the CPU 101 is counted and it is determined

whether a fixed reference period of time, for example, one second, has passed or not (step

S202). In step S202, when it is determined that one second has passed (step S202-YES),

the time data in the time data storage area allocated in the RAM 103 is counted up (step

S203). When the determination result indicates that one second has not passed (step

S202-NO), the processing advances to step S204.

The paragraph starting at page 18, line 17 and ending at page 19, line 3 has

been amended as follows.

In step S403, when it is determined that the power is not turned OFF (step

S403-NO), the processing advances to step S406. When the power is turned OFF (step

S403-YES), the recording unit 200 ~~calculates~~ calculates, based on the received time ~~data~~ data, a time interval in which recording has not been executed since the preceding recording operation until the present recording operation (step S404). This time interval, in which the recording head 205 has not performed the recording operation, is calculated under the control of the CPU 201 in the recording unit 200 by determining the difference between the time data related to the preceding recording stored in the nonvolatile memory 207 and the received present time data.

The paragraph starting at page 19, line 11 and ending at line 14 has been amended as follows.

In step S406, the recording unit 200 performs ~~the~~ a recording preparation processing other than the recovery operation, such as setting of recording parameters.

The paragraph starting at page 20, line 17 and ending at page 21, line 3 has been amended as follows.

When it is detected that the power of the main body control unit 100 is turned into the OFF state, the time data is not formed by means of pseudo-time measuring means utilizing the system clock because the CPU 101 of the main body control unit 100 is deactivated. In this case, the time data is not transmitted to the recording unit (step S302 in FIG. 3 is skipped and the processing advances to step S303), and the uniform recovery

operation in a conventional ~~manner~~ manner, which is the high ~~suction~~ suction, is conducted

irrespective of the time interval during non-recording operation (step S408), thereby

eliminating the clogging of the nozzle and preventing the occurrence of non-ejection of the

ink.

The paragraph starting at page 22, line 15 and ending at line 23 has been

amended as follows.

In the foregoing description, droplets ejected from the recording head ~~is~~ are

described as ~~ink, in addition, a~~ being ink and the liquid contained in the ink tank is

described as ~~ink,~~ ink; however, the ~~content~~ liquid is not limited to ink. The ~~content~~ liquid

in the ink tank may be, for example, a treatment liquid or the like to be ejected onto a

recording medium, which is effective to enhance a fixative property or water-proofing of

the recorded image and to increase the quality of the image.

The paragraph starting at page 23, line 4 and ending at line 11 has been

amended as follows.

As described above, according to the present invention, even when the main

body control unit does not include time measuring means operable to generate real time

data, the recording unit receives pseudo-time data before a recording operation to thereby

calculate a time interval in which the recording operation has not been performed, thus

allowing the suction recovery operation in accordance with the calculation result.

The paragraph starting at page 23, line 12 and ending at line 17 has been

amended as follows.

Alternatively, the excessive suction recovery operation is suppressed,

thereby preventing an increase in an amount of sucking ink suction and a reduction in

throughput of recording processing due to delayed recording preparation processing after

the power is turned ON.

The paragraph starting at page 23, line 22 and ending at line 27 has been

amended as follows.

The present invention is not limited to the above embodiments and various

changes and modifications can be made within the spirit and scope of the present

invention. Therefore, to appraise apprise the public of the scope of the present invention,

the following claims are made.